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SOME NEGLECTED PARADOXES OF VISUAL SPACE. II

THE paradoxes of the blind spot and of peripheral vision exhibited in this JOURNAL a month ago seem to have left on our hands a spatial discontinuity which threatens the natural-realistic hypothesis there invoked to clear up those same paradoxes. If, one might protest, visual fields are aggregations of unit extensions, each formless and boundless, the clean-cut shapes and boundaries which the uninstructed eye senses must be illusory, and hence natural realism a vulgar error. How can spaces without form or limit, by merely standing in some inexplicable fashion next to one another in the mind, ever acquire or weave discrete objects of consciousness? And, granting that the miracle does occur, how can these things be more than subjective, if extensions out of which they are evolved are as we have described them and genuinely real to boot?

These troubles harass only the half-hearted realist. The bold one, knowing that to dip timidly into any paradox is to invite a broken back, sticks to his hypothesis through all its strangest, most discouraging passages. He never mistakes a hard knot for a rout. He knows that it is frail wit to desert a point of general view just because most of the good people who have climbed the hill have observed some of its vistas carelessly. Him we must imitate here, for it is his philosophical explanation that we are putting to the test of the unusual facts already noted. To cover these facts, it must reject several doctrines long since approved by psychology. Whether, in the resulting conflict, it is realism or the science that must yield, is another matter. But the former must win or lose on the strength or weakness of the following three pseudo-paradoxes, each of which is inextricable from it:

1. The continuity of the visual field is in no manner a feature or an outgrowth of extension as extension; it is nothing more than a product of blindness. It involves neither an *a priori* synthesis nor any associative mechanism nor yet a primitive "vaster sensible extent which can enter the mind simply and all at once."

2. The group of extensions constituting a given visual field is essentially like a group of simultaneous tones or pressures or pains in its ordering and manifoldness.

3. The same logic that is valid in all arguments touching physical and geometrical spaces holds for visual space and must be used in the interpretation of perceptual errors, illusions and the so-called "objective worth" of empirical data.

1. Ramon y Cajal and other histologists have shown that each rod (and cone) in the retina is separated from its neighbors by protoplasm insensitive to ether vibrations. Thus, a microscopical blind spot exists between every pair of nearest retinal organs, a spot none the less significant because very small. Now, says the realist, each extension has neither bound nor shape; hence, when twenty or a million are empirical simultaneously in the same organism, they have no rough edges which must be fitted and no gaps to be filled in. Where there is no space-sensing organ, the space there is not a member of the empirical space system in the remotest sense. If, by compulsion of habit and language, we must speak of the consciousness system as being "somewhere," even when we do not mean that it is, *quâ* consciousness, a piece of some space group, it is permissible to say that the extensions between rods and cones are in a wholly different dimension from that in which the empirical spaces lie. Strictly, of course, this way of putting it is wrong; it becomes roughly accurate when "dimension" is construed as "determinant" or "mode of determination." A much less treacherous analogy is this: the intervening stretches of insensitive protoplasm are as impotent to interfere with the empirical spaces, or to hold the latter apart in discrete spots, as the interstellar ether is impotent to act as a screen against the pull of gravity between earth and sun. And, as there is no material screen for gravity between material objects, so too there is, from the beginning, no empirical screen—no gap or resisting medium—between empirical objects. Though the comparison is here offered only as a hint, it leads up to a most fruitful angle of contemplating psychic complexes; but of this another day. Now let it be taken as nothing more than a generalized, slightly amended reaffirmation of Professor James's well-defended thesis that "in the field of space the relations are facts of the same order with the facts they relate. If these latter be patches in the circle of vision, the former are certain other patches between them. . . . The relation of position between the top and bottom points of a vertical line is that line."[1]

If anybody chooses to translate this into some assertion about the origin of spatial order being in "feelings of transition," let him do so; realists are still free to find in it a richer meaning, namely that the relations in which things stand are phases of the things themselves, somehow immanent in them; not that a single pure extension of the visual type, existing alone empirically, manifests a whole geometry of positional and direction relations; and not that such an extension is *nothing but* a complex of these relations. The peculiar isolation, or better, insulation of each consciousness assists us to illustrate, from a comparison with the whole physical universe, how neither of these opinions is implicated in the realistic interpretation of that immanence. Viewed from within, a mind knowing only one pure extension unit at a given moment would know it as a physicist knows the weight of the whole material universe. Without in any wise attenuating the nature or reality of matter, the physicist may say that the totality of gravitating things has no weight; for weight is a peculiar relation resulting from the spatial and structural differentiation of matter. It would not be true to say that the universe's weight equals the sums of the weights of all its parts; neither can it be maintained that weight is nothing but a relation, meaning thereby that individual "things in themselves" are quite as weightless as their totality. So too in the case of a creature whose only eye contains but one rod (unit organ). Size and position would have no meaning, provided, of course, that no other sense organs furnished other differentiated spaces. To tell such a creature that there might be two extensions, one larger than the other, or that a triangle is possible, would be as futile as to assure a man that greenness has a cube root, or that virtue is a pentagon. A blank contradiction lurks in the suggestions. And yet, ignorant of all spatial order, the creature might well experience vividly the pure outstretching that we catch with such difficulty at the fringe of vision. That outstretching would, to be sure, suffer no comparison with the physical expanse we call the visible universe; it would not be the abode of things and the scene of movements. It would either exist or not exist, and if colored, at most only temporally differentiated as to this character. And yet the peculiarity of extension would not have gone lost with this uttermost simplification. Now suppose the creature to grow another eye on the opposite side of its head, and again an eye having only one rod. Then, were the two extensions perceived in any manner together—*i. e.*, were they truly given as extensions and not as two genera, such as hue and noise—they would be given as adjacent without any act of synthesis, simply and solely by virtue of the fact that, being both extensions, they are distinct and simultaneous. The situation is, I maintain, absolutely the same, at bottom, as that given, if not as a historical event, then as a logically conceivable one, when that phase of the universe which we call matter showed its first, its very first, inner differences. Weight, a phase of material differentiation, thereupon happened, but not as an event distinct from the cosmic rift; it *was* of the rift itself. So with the positional relation in the space of our microcosm; it is merely one aspect of the existence of two different empirical spaces, and for its creation we need no more and no less of a noumenal self or an *a priori* synthesis or an associative mechanism of local signs than for the establishment of the bare empirical extensions themselves.[2] But one heresy leans upon another; to the better defense of this first one, the second must be summoned.

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[1] "Principles of Psychology," II., p. 149, etc.

2. The radical difference between visual spatial order and the *Gestaltsqualität* of other sense groups, particularly tones, has always been insisted upon by psychology. As spokesman for nearly all investigators, Professor James says:

> Let us take the case of an actual line of light none of whose parts is ideal. The feeling of the line is produced . . . when a multitude of retinal points are excited together, each of which, *when excited separately*, would give rise to *one* of the feelings called local signs. Each of these signs is the feeling of a small space. From their simultaneous arousal we might well suppose a feeling of larger space to result. But why is it necessary that *in* this larger spaciousness the sign *a* should appear always at one end of the line, *z* at the other, and *m* in the middle? . . . The more philosophic student . . . will reflect that it is conceivable that the partial factors might fuse into a larger space and yet not be located within it any more than a voice is *located* in a chorus. He will wonder how, after combining into the line, the points *can* become severally alive again; the separate puffs of a sirene no longer strike the ear after they have fused into a certain pitch of sound. He will recall the fact that when, after looking at things with one eye closed, we double, by opening the other eye, the number of retinal points affected, the new retinal sensations do not as a rule appear *alongside* of the old ones and additional to them, but merely make the old points seem larger and nearer.[3]

As books and books have been written on this subject without exhausting it, detail would here serve the critic ill. I shall therefore indicate certain broad facts which, if we cast off every habit of subjectivism and make earnest with the nativist's hypothesis that extensions are directly given, wipe out every essential difference between visual and other orders, reduce the whole phenomenon of form quality to an aspect of least perceptible difference, thus paving the way for the third heresy.

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[2] I am not denying the necessity of an elaborate mechanism for the development and control of visual spaces through all their changes of color and pattern from moment to moment; nor that of another mechanism for the relating of visual spaces to tactual, auditory, and motor. It were not heresy but madness to disown such. All that has been urged is against regarding continuity as their product. For aught that is here implied, all the particular arrangements of visual space may be determined in some degree by factors drawn from a dozen parts of the body, "associated" centrally, and "read into" the spaces of the eye.

[3] "Principles," II., p. 163, etc.

(*a*) For the realist, an extension is an outstretching and must always be treated as such, never—or only for certain special purposes—as a feeling, or a neural current, or a mode of energy. Two extensions are, therefore, two outstretchings. Different outstretchings are, just so far as different, two or more. And their difference is with respect to their outstretching, not with respect to color, or shape, or pleasantness, or vividness. All this is more than simple observation, it is pure definition of a fundamental empirical peculiarity. What, now, must an extension group be, if not a complex whose inner distinctions are distinctions of outstretching? So far as component extensions do fuse into one which is merely larger than its factors, they do not make a group at all, any more than five middle C's struck simultaneously on as many identical tuning-forks make a chord. Now, as a matter of fact, such fusion does occur in visual space; first, when an extension given through one eye is projected into one given through another—*i. e.*, in the case of corresponding retinal points; and secondly, when thousands of *minima visibilia* combine into a considerable line or area. The first instance is essentially identical with that of hearing the same tone with two ears instead of with one; the second with that of hearing a large number of tones simultaneously which, if heard individually and in sequence, would differ from one another in gradation by the least perceptible minimum of pitch, loudness, or timbre. I can not see a line or area as composed of as many minimal points as are actually involved in its making. Even if certain *minima* are marked by distinguishing colors or brightness, other retinal functions than those of space-sensing, notably contrast and after-imagery and central anesthesia during eye motion, obscure them. It might be going too far to say that these disturbers are to the *minima visibilia* what beats and difference tones are to minimally graduated simultaneous tones of a chord; but the likeness is profounder than psychologists seem to realize. In each case mere multitude involves new types of interrelating (from the physiological standpoint, fresh functions) which act as a mesh or veil thrown across the field of simple original units, or, in other cases, as a higher order of tension among the latter, pulling them into larger unit masses, much as gravity does with primitively differentiated matter. But what does all this signify as to the group character of an extension complex? Nothing more than that what is a distinct extension unit under certain conditions is not under others. There is in it absolutely no suggestion that, by some hook or crook, a group of extensions might still be a true group after every distinction as to outstretching had disappeared from within it. As two tones giving only a larger (louder) are tonally identical, so two extensions which combine under circumstances that make of them only one outstretching are not a group or spatial order at all, but spatially identical under the given circumstances. To suppose extensions truly different to blend so as yet to be a true extension group or complex, although lacking all positional distinctions, is on a par with supposing five sounds, originally distinct as to pitch to differ, when given at once, not as to pitch at all, but only to produce a louder single tone and yet to constitute a chord. So stated, the mystery of spatial order reduces to a pure inner contradiction. The only other way of stating it is through the question: How is difference of extension possible *überhaupt?* But who cares to tackle that? It must now be clear that I am arguing not alone for the reality of extended things, not alone for the immediacy of the experience of extension, but also—and above all else—for the reality of extension as extension. If this be Cartesianism, make the most of it!

(*b*) The "philosophic student" who, wondering "how, after combining into a line, the points can become severally alive again," is disturbed by the fact that the separate puffs of a sirene no longer strike the ear after they have fused into a certain pitch, follows a will-o'-the-wisp down a side lane. Any comparison of this case with that of visual space order must do violence to one or the other, so various are their circumstances. The heard puffs of the sirene are not phases or qualities of the tone they produce; they are only effects of certain causes which, acting cumulatively, bring about the tone. This is not grouping into a simultaneous whole, but rather the massing of effects in a sequence. Its nearest analogue in visual space is not a line, but a color-point in the periphery, which becomes visible only when moved. The fleck at a given spot and instant corresponds to the single sirene puff; as the latter is not the tone, so too the fleck is neither of the hue nor of the shape of the moving point. And, conversely, as the separate puffs of the sirene no longer strike the ear as distinct effects after they have fused, so also the extensions traversed by the color are not distinct after the color has passed beyond them; otherwise we should sense, not a moving point, but a more or less homogeneously colored line. Only by repudiating every realistic hypothesis of empirical space at the outset can one find a difficulty here. Speaking of the visual elements, not as genuine extensions, but as feelings or local signs, a psychologist may fairly perplex himself; for mere feelings *in general* may synthesize in indefinitely many ways; forty retinal signs, as signs in general, might, for aught any mortal wot, make a smell no less handily than a triangle. Let him be a nativist in psychology and a realist in philosophy, though, and then the ordering and massing of extensions, while not deducible from the nature of an isolated *minimum visible,* is pretty definitely limited by, and foreshadowed in, the latter.

(*c*) Simultaneous extensions, I say, must be outside of one another, if they are in any manner distinct as extensions. But this does not force upon realism the hypothesis of a "vaster sensible extent which can enter the mind simply and all at once" and which is a sort of receptacle or a breeding-ground for all the little spaces later discriminated. I have never understood why those psychologists who resort to such a device to explain space do not need a noise in general or an *a priori* uproar to make intelligible the distinguishing of simultaneous tones. Doubtless I shall be told that the history of mental development forces upon the psychologist the primitive space or the pre-empirical space-making faculty. It is precisely this necessity, though, which I do not see, from the realistic point of view. The psychologist's contention, as it interests us, is not that, as a matter of history, some " vaster sensible extent" has preceded the differentiated spaces in the conscious system; it is that, as a matter of logic, these later differentiated spaces can have become discrete only by virtue of such a preexisting general space, which is conceived as a sort of geometrical *tabula rasa* whereupon points, shapes, and distances may be drawn by the willing mind. For a thoroughgoing realist, this hypothesis is not demanded by the facts; taken literally, indeed, it turns upon itself, for if a small space can be sensed only through a prior larger one, why must not this latter, too, depend for recognition upon the good will and succor of a still bigger space, and so on as in the Hindu myth about the earth's supporters? I should not urge this a dialectician's argument against it, though, because the realistic interpretation of psychological evidences strikes harder and cleaner. That space is first a great blur and afterward a neat pattern need mean no more for psychology and metaphysics than the fact that on one side of a prism ether vibrations run together, and, but an infinitesimal fraction of a second later on the other side of the prism, they are dispersed in the spectral bands. The physicist does not argue that these bands could not exist without a previous mixed light; he regards the latter simply as an earlier condition which, through certain circumstances, passes over into, or is succeeded by, the dispersion. The change is not brought about by mixed light; mixed light is not necessary to the result, for the ether might conceivably be so disposed somewhere as to hold the different wave-lengths apart from the very instant of their generation. This, at least, is a logical possibility. So, too, with spaces themselves; under some empirical circumstances they run together into one undifferentiated extension and under some others are discrete.

The most plausible conjecture about the psychologists who use the vaster space to make possible the lesser, inner kinds is that they have fallen between the two stools of realism and subjectivism. Thinking of seen spots as sensations, feelings, or local signs, they still can not or will not regard the spatial cosmos known to scientist and normal man as a mere fabrication of their respective nervous systems, and so they compromise by putting the sensations into the cosmic order. The result is the contradictory but seemingly realistic doctrine that the things we see are *in* the cosmic space, instead of *being* themselves that space. Whoever scents the dangers of such an interpretation will have no trouble in seeing that two extensions may "get into" an empirical system with no more ado or clap-trap than two sounds may. He will also understand that they are parts of a greater space only in the same sense that a tone in a chord is a part of a greater tone; and that the discontinuity of the radical realist's visual field (the aggregation of formless and boundless units) is as insignificant and as harmless as its true parallel in a tone complex, namely, the silent stretches between the component sounds. As the reader may not know what these silences are, just a word in explanation. Three notes, C, E, and G, let us say, are sounded together. C is felt as removed tonally several degrees from E. But the tones constituting these degrees are not sounded. They simply do not exist in the given empirical system. So, in one sense they are silent. But this does not mean that they are actually given as silences. For instance, I do not hear, somewhere or somehow in the chord CEG a break or a still interval. In other words, the tonal difference is not itself a tone; it is not even an unheard one. It is an immediate and immanent relation of the given tones, a relation that changes upon the introduction of fresh tones into the same system precisely as the introduction of an extra body into a system of gravitating bodies instantaneously shifts and alters the tensions throughout the whole system. What Professor James says of spatial relations holds true here; tonal distinctions are the distinct tones themselves, "facts of the same order with the facts they relate." Now, as the silent tones constituting the degree of difference between C and E, and E and G, do not, by their absence, fill the chord with silences, so, too, whatever extensions might be sensed, *under other circumstances* between two extensions given as adjacent and different, are not present *even as absent*. They are, to revert to physics for an illustration again, no more important to the relation of given extensions than is a body completely removed from a closed gravitating system to the pulls within that system.

3. If these opinions can be held against all attacks of the subjectivists, the geometrical interpretation of so-called visual illusions and errors will be easy. Recall our imaginary animal with two eyes of as many rods; it might see something ten miles due north as adjacent to something as far due south of its head. The traditions of psychology and epistemology have it that this predicament makes nonsense of all realistic theory. The continuum manifestly has no objective existence; indeed, it does not even correspond to an outer adjacency. Be crassly realistic, however, and this discounting becomes invalid. The extensions which the animal sees are, for the realist, neither in space nor signs pointing to space, but the very spaces which geometers and physicists deal with. They meet, then, as physical and geometrical spaces do. When considering these latter, nobody finds it hard to comprehend how two lines may meet in a point, two planes in a line, or two solids in a plane. Because the meeting-place of two planes is much smaller than the planes that meet and, in a very real sense not of the same kind with the latter, being only a line, do we hear the geometer arguing that the meeting is illusory? Or, again, is this inferred on the ground that the infinitely greater part of each of the planes lies far away from the intersection and in opposite directions? Is this a reason for supposing that the line constructs the planes out of its own inwards? Or does the geometer assure us that, if the planes meet in this particular line, they must meet in every other? This is an unheard-of insanity in every mathematical and physical science, but popular, aye, even sanctified, in psychology, the native courage of whose infancy has been blighted by the yarns its Kantian nurses have told it. Not alone the hypothesis of non-spatial local signs, but, in a more deftly hidden manner, also the doctrine advanced by many realists that space is nothing but a sort of relation falls into these fallacies of the subjectivists, knee deep or up to the ears. The whole attempt of the epistemologists to explain how adjacent things in one's mind stand for, or are adjacent things outside of, mind springs from a pseudo-realism which, I fancy, is the mother of most idealisms and surely of some classical doctrines which have unfairly earned the name of natural realism. "If adjacent in the conscious system," runs its gospel, "then adjacent elsewhere; and if adjacent elsewhere, then adjacent in the conscious system." The trouble with this postulate is that it is far too radical and simple for common sense, too beautiful to be true. The natural realist, he who takes his world naturally, I mean, and not the philosopher who may happen

to have called himself by that name—is more modest with his hypothesis; he believes, as a working postulate, that it is the real world order, and the real things in it which he comes to know through experience, but not that the order as known or as immediately presented is in any strict sense a copy or duplicate of the order as existing independently of his private perceptions and thoughts. He much prefers the superficial paradox and the grave difficulties of this double position to either of the other two views in which the pseudo-realistic postulate brings up, namely, radical empiricism and objective idealism; and he prefers them because, though they press him hard, at least they do not mock his instincts and demand an elaborate mythology for their foundation. But the best warrant for his accepting some kind of a representative realism appears in the immediate success attending the strict application of such a theory to the apparent paradoxes of visual space, which have furnished almost the only meat on which anti-realism has fed since Democritus.

To describe and defend the changes which a thoroughly realistic interpretation of visual space must bring about in the representative theory carries us far beyond our present topic. A suggestion of them, though, may help to mark the drift and also to make clear how useful the geometrical handling of visual spaces robs all the hard-worked paradoxes of their sceptical import. Let us anticipate, then, the purged theory to the extent of saying that it will regard adjacent or intersecting extensions seen as "representing" objective extensions only in the manner that the line in which two planes intersect or the field in which two forces cross "represent" these planes or forces. As the line *is* both planes, and yet is but the smallest part or feature of each, so an empirical adjacency or intersection *is* the adjacent or intersecting things, though only a minute phase of them. And, again, as two points determine a line, or as three points not in the same line determine a plane, and so on, likewise with empirical spaces: though each of a group may be a most trivial part of a larger cosmic space, the group, if properly chosen, may express the nature of expanses forever beyond immediate perception. This may not be representationalism in any of its strict historical meanings; indeed, it repudiates all these theories which treat a sensation as either a miniature or a symbol of its cause. But a part-and-whole relation, a relation of condition, place, and function, for which I can find no fitter name than representation, is most decidedly involved in it, in a peculiar manner closely akin to the spirit of pragmatism. That such an interpretation, consistently developed, will preserve a genuine realism without a taint of subjectivism or Kantianism, and will at the same time keep the epistemological dualism which the natural sciences demand, while casting off the pious brand, is not a forlorn hope.

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DISCUSSION

THE AFFILIATIONS OF PRAGMATISM

IT is not possible ever to read anything from the pen of Professor Lovejoy without being impressed both by that pleasantness and clearness in statement and that scholarly vision of historical continuity in philosophy which are his notable characteristics. The latter quality, especially, appeals to me, the more so as it is rare in these days of grubby detail in historical research and turgid "independence" in spontaneous insight. Contemporary controversy needs a little to be enlightened by a vision of the past, and a little to be sobered by a realization of the intimate nearness of intellectual movements apparently long since lapsed. It is, accordingly, a genuine service that Professor Lovejoy renders both to pragmatism and to realism in his suggestive treatment[1] of Professor Montague's investigation into their compatibility. It is, however, a service which has the defects of its virtues, inasmuch as history proceeds by mutations as well as by continuous alterations, and it is always easy, with our retrospective conceptualizing, to confuse the one with the other. What we already possess is so convenient and satisfactory a mould for the new material, so warm and intimate a light to see the strange thing by, that the temptation to envisage the fresh fact in the old concept is invincibly powerful, and not infrequently the ancient glamour serves rather to befog than illumine the novel discovery. Or it suffuses the latter only in part, perhaps its least significant part, leading one to think that what is so suffused is all that is. To be without the sanity of historical vision is certainly bad, but to allow its perspective to distort the new and unstoried object is worse. I can not help feeling that some such distortion is present in Professor Lovejoy's so lucid and interesting orientation of pragmatism and realism.

The pragmatic movement, Professor Lovejoy thinks, is a compound product—the union essentially of "instrumentalism" and "nominalism"—nominalism most of all. Pragmatism contains "the typically nominalistic motive—the simplifying, clarifying, *denkökonomische* motive; the typical nominalistic method—the definition of universals as collective names for particular items in experience;

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[1] This JOURNAL, Vol. VI., pp. 575–580.